

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 August 2002 (08.08.2002)

PCT

(10) International Publication Number
WO 02/062092 A1

(51) International Patent Classification⁷: **H04Q 7/38**,
G06F 17/30

(21) International Application Number: PCT/FI02/00063

(22) International Filing Date: 28 January 2002 (28.01.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
20010170 29 January 2001 (29.01.2001) FI

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(81) Designated States (*national*): AE, AG, AL, AM, AT (util-
ity model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,

CN, CO, CR, CU, CZ (utility model), DE (utility model),
DK (utility model), DM, DZ, EC, EE (utility model), ES,
FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL,
IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,
LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM,
PH, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model),
SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU,
ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR,
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent
(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR,
NE, SN, TD, TG).

Declarations under Rule 4.17:

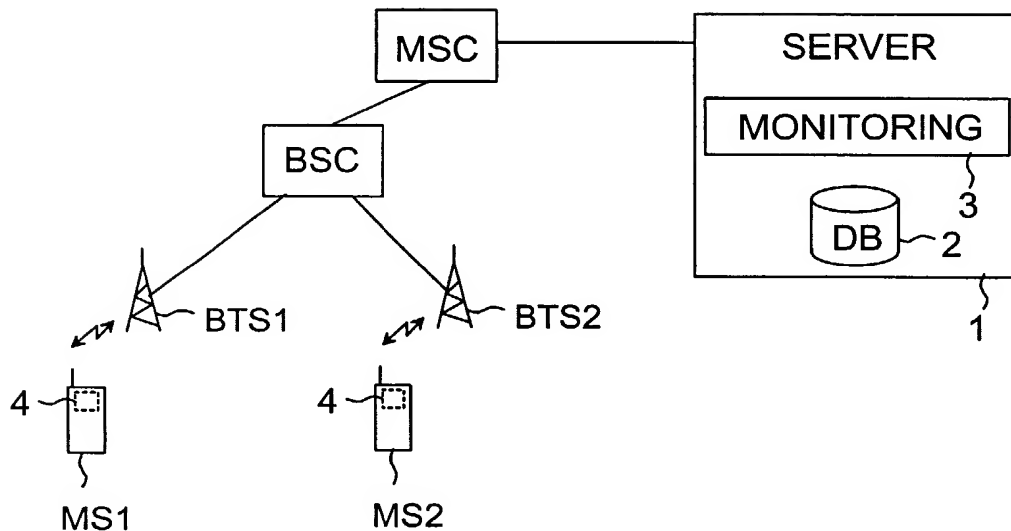
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations*
- *of inventorship (Rule 4.17(iv)) for US only*

Published:

- *with international search report*

[Continued on next page]

(54) Title: A METHOD AND A SYSTEM FOR FINDING A PARTNER BASED ON LOCATION INFORMATION IN A COMMUNICATION SYSTEM



(57) Abstract: The present invention relates to a system comprising: mobile stations (MS1-MS4), and means for locating the mobile stations. To allow the users of the mobile stations to find a partner, the system further comprises: a database (2) in which information is stored about parameters determined by persons seeking a partner, and monitoring means (3) that monitor the locations of the mobile stations (MS1-MS4) used by the persons seeking a partner and transmit information indicating that a partner corresponding to the parameters has been found, provided that the mobile stations of two persons seeking a partner are located close to each other and that the parameters stored in the database (2) indicate that the persons in question are compatible.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A method and a system for finding a partner based on location information in a communication system.

5 **[0001]** The present invention relates to a method with which a person seeking a partner may find a suitable one in his immediate surroundings. A suitable partner may be for example a person who shares a common interest, who is suitable as a travel companion, or maybe even as a life-companion.

10 **[0002]** Prior art knows a solution in which persons looking for a partner use a specific radio device with a relatively short range. The radio device is small and thus fits into the pocket, for example. When activated, the device generates a radio signal to indicate its presence to other similar radio devices. If this kind of radio device detects the presence of another, similar device (on the basis of the signal broadcast by the other device), it produces an audio signal to inform its user about the presence of the other, similar
15 device. This way two persons looking for a partner may locate each other on the basis of audio signals produced by their radio devices, when the persons are within a sufficiently short distance from each other.

20 **[0003]** The above described prior art involves several drawbacks. First, a person seeking a partner must obtain a radio device designed for this specific purpose and carry the device along. In addition, the detecting of a partner may cause embarrassment because other people will also notice the audio signal produced by the radio device. Further, due to the short range of the radio devices, they must be extremely close to each other in order to detect the signals they transmit to one another. Extending the coverage does not
25 provide any benefit, because the users of the radio devices must be sufficiently close to each other when the radio devices produce the audio signal, otherwise it is impossible to locate the partner.

30 **[0004]** It is an object of the present invention to solve the problems related to the above prior art solution and to provide a user-friendly solution that further facilitates the finding of a partner. This object is achieved by the method of the invention for finding a partner for a person seeking a partner. The method of the invention is characterized by comprising the steps of storing in a database parameters determined by persons seeking a partner; monitoring the locations of mobile stations used by the persons seeking a
35 partner; and transmitting information indicating that a partner corresponding to the parameters has been found, provided that the mobile stations of two

persons seeking a partner are located close to each other and that the parameters stored in the database indicate that the persons in question are compatible.

5 **[0005]** The invention further relates to a system in which the method of the invention can be utilized. The system of the invention comprises mobile stations, and means for determining the locations of the mobile stations. The system of the invention is characterized in that it further comprises: a database in which information is stored about parameters determined by persons seeking a partner; and monitoring means that monitor the locations of the
10 mobile stations used by the persons seeking a partner and transmit information indicating that a partner corresponding to the parameters has been found, provided that the mobile stations of two persons seeking a partner are located close to each other and that the parameters stored in the database indicate that the persons in question are compatible.

15 **[0006]** The underlying idea of the invention is that a partner search based on monitoring the locations of the mobile stations of persons seeking a partner increases the user-friendliness and efficiency of the search. The persons seeking a partner do not need to obtain or carry along any additional device specifically designed for partner search, but it suffices that they carry
20 their mobile station, which they need for other purposes as well. The utilization of the mobile station further enables the information about a matched partner to be transmitted to the persons seeking a partner in a discrete manner, for example by means of a short message sent to the mobile stations of the persons in question or, alternatively, by setting up a connection between their
25 mobile stations.

[0007] In the context of the present invention, the concept of partner should be understood in a broad sense. A suitable partner may be for example a person who shares a common interest, who is suitable as a travel companion, or maybe even as a life-companion. For a person meaning to buy
30 a specific product (such as a car), a person selling that kind of product may be a suitable partner. In that case the buyer has determined parameters describing the car he is interested in, and, correspondingly, the seller has determined parameters describing the car he is selling. The invention thus enables the buyer and the seller to contact each other. A further example is a
35 case in which a person who needs a specific service determines parameters describing the service in question. Correspondingly, a supplier of the service in

question determines parameters describing the service he is capable of supplying. As a result, a connection may be set up for example between the driver of an excavator (service supplier) who happens to be passing by a detached house, and the owner of the house (person needing a service) to allow these persons to agree on an excavation the house owner wishes to have done.

[0008] The preferred embodiments of the method and system of the invention are disclosed in the accompanying dependent claims 2 to 7 and 9 to 15.

[0009] In the following, the invention will be described in greater detail, by way of example, with reference to the accompanying drawings, in which

Figure 1 is a flow diagram illustrating a first preferred embodiment of the method of the invention;

Figure 2 is a block diagram of a first preferred embodiment of the system of the invention;

Figure 3 is a block diagram of a second preferred embodiment of the system of the invention; and

Figure 4 is a block diagram of a third preferred embodiment of the system of the invention.

[0010] Figure 1 is a flow diagram illustrating a first preferred embodiment of the method of the invention. In block A of Figure 1, parameters relating to each person seeking a partner are stored in a database. The parameters to be stored include information about the person in question and also about the partner that the person is seeking. The parameters to be stored may thus include characteristics of the person (such as age, gender) and information about his hobbies, for example. In addition to this information, it is also possible to store in the database information indicating for example whether the identifier data of the person in question, such as his telephone number or IP address, may be given to potential partners. Further, the period of time when the person in question wishes the partner search service to be active can also be stored in the database. In other words, the user may determine that the service is not active on weekdays during working hours (specific hours of the day), for example, in which case the movements of his mobile station will not be monitored during that time.

[0011] There are several alternatives for storing the information in

the database. One of them is to provide the persons seeking a partner with access to the database from their mobile stations and through the mobile communications network, whereby the users can use their mobile stations to send the parameters they wish to be stored to the database. This allows persons seeking a partner to read their parameters and change them from their mobile stations whenever they wish. Depending on the application, the information may be entered or changed using a WAP browser (Wireless Application Protocol) or SMS (Short Message Service), for example. It is also conceivable that some other user interface, such as a WEB interface, is used.

[0012] By allowing the users themselves to change the information stored in the database from their mobile stations, the users are also allowed to activate and deactivate the service from the mobile station. Consequently, a particular user does not need to be constantly within the coverage of the service, nor does he need to inform the hours of the activation and deactivation of the service in advance. When the user wishes that his partner search is active, he uses his mobile station, for example, to inform the database accordingly, and the partner search service involving the user is activated. Correspondingly, the user may inform that he does not want to be covered by the service, whereby the service is deactivated for his part. It is also conceivable that in connection with the activation of the service, the user also enters information indicating how long he wishes the service to be kept active. When the time entered by the user expires, the service is automatically deactivated for his part, without the user being required to take any action to deactivate it.

[0013] Within the context of the invention, it is also conceivable that the actual data input into the database is performed by the system operator. In that case persons seeking a partner supply their information to the operator using a suitable means (e.g. phone, letter, telefax, e-mail), and the operator enters the information into the database.

[0014] In block B the locations of the mobile stations of persons seeking a partner are monitored. There are several alternatives for carrying out the monitoring of mobile stations, some of which are described, by way of example, in connection with the block diagrams of Figures 2 to 4.

[0015] The monitoring of the mobile stations can be implemented such that whenever a mobile station changes its location, its new location is compared with the latest location information of other mobile stations that are

to be monitored. If the comparison shows that two monitored mobile stations are close to each other, the parameters stored in the database for the users of these mobile stations are compared in block C.

5 **[0016]** If it is detected in block C that the parameters stored in the database indicate that the two service subscribers located close to each other are compatible, information about this is transmitted in block D to at least one of the service subscribers. Information about a successful partner search may be submitted by sending a message containing the number of the mobile station of the matched partner to the mobile station of one or both of the
10 persons. Alternatively, the message may include a service number that the person who received the message may call in order to be connected to the mobile station of the matched partner. This allows a connection to be set up between the service subscribers without them having to give their contact information (telephone numbers, for example) to each other. A further
15 alternative is an automated connection set up between the mobile stations used by the persons involved. The connection may consist of a conventional call, image call or a connection allowing the users to exchange text messages, for example.

[0017] The users may have stored in the database information that
20 is not automatically transmitted to the service subscribers when a partner is found. In that case the service subscriber or subscribers may be provided with a possibility to use their mobile stations to search the database for additional information about the matched partner, before a connection is set up between the matched persons. On the basis of the additional information the service
25 subscribers can then decide whether they want to contact the matched partner in the first place.

[0018] How close to each other the mobile stations have to be in order that information about a matched partner should be transmitted may vary according to application. The required proximity also depends on the accuracy
30 of the positioning method. In some solutions it may be purposeful to determine that the distance between the mobile stations should be below a specific distance for the information transmission to occur. Alternatively, in other solutions the information can be transmitted when the mobile stations are located for example within the same location area in the mobile
35 communications network, or even in the same radio cell.

[0019] Figure 2 is a block diagram of a first preferred embodiment of

the system of the invention. The method of the flow diagram of Figure 1 may be applied in the system of the block diagram of Figure 2.

5 **[0020]** The block diagram of Figure 2 shows a part of a mobile communications system, which comprises base stations BTS1 and BTS2, base station controller BSC and mobile services switching centre MSC. From the mobile services switching centre there is a data transmission connection to a server 1 that allows a partner search service to be provided to mobile stations located within the coverage of the mobile communications service. Service users can contact the server 1 from their mobile stations to have the parameters they have determined stored in the database 2 of the server 1. The server 1 further comprises monitoring means 3 that can be implemented by means of a computer program, for example.

10 **[0021]** In Figure 2 it is assumed that the users of mobile stations MS1 and MS2 use the partner search service available at the server 1. The users of the mobile stations have therefore stored in the database 2 the parameters they have determined. Consequently, the locations of the mobile stations MS1 and MS2 are monitored by the monitoring means 3 of the server 1.

15 **[0022]** In Figure 2 it is further assumed that the mobile stations MS1 and MS2 are both equipped with location means 4. The means in question may be for example GPS-receivers (Global Positioning System), which allows mobile stations to determine their positions by using satellites. In the embodiment of Figure 2, the locations of the mobile stations may be informed to the server 1 by the mobile stations themselves who may send information illustrating their location directly to the server 1 through the mobile communications network, for example. This enables the mobile stations to send the location information always when their location changes over a predetermined limit, or when a predetermined time has elapsed from the previous transmission.

20 **[0023]** Alternatively, the mobile stations shown in Figure 2 may send their location information to an element of the mobile communications network, this element being programmed to forward the information to the server 1, or the server 1 is programmed to ask the mobile communications network for the location information of the mobile stations concerned at predetermined intervals.

25 **[0024]** Finally, the location information transmitted to the server 1 is

supplied to the monitoring means 3 for use. The monitoring means 3 can then check whether the mobile stations are located close to each other (within a predetermined distance from each other, for example). If they are, the monitoring means 3 check whether the parameters stored in the database indicate that the users of the mobile stations are suitable for each other. If according to the parameters the persons are compatible, the monitoring means transmit information stating that a partner has been found. The information may be transmitted in a message sent to both the mobile stations, the message including a number that the users of the mobile stations MS1 and MS2 can call to contact each other. Alternatively, the monitoring means 3 may trigger a call set-up process between the mobile stations by sending a call set-up request to the mobile communications network.

[0025] If the users of the mobile stations MS1 and MS2 wish, they may change their parameters stored in the database from their mobile stations (or through some other user interface). To do this, the users set up a connection to the server through the mobile communications system, after which it is possible to read the old information and to enter new information. According to the invention, the user can also activate and, correspondingly, deactivate the service by entering a command to this effect from the mobile station to the server 1. In other words, the user can freely select when the partner search service is active for his part.

[0026] Figure 3 is a block diagram of a second preferred embodiment of the system of the invention. The embodiment of Figure 3 corresponds otherwise to the embodiment of Figure 2, except for the implementation of the positioning of the mobile stations. Figure 3 illustrates a case in which the location of mobile stations MS3 and MS4 is monitored on the basis of information stored in a visitor location register VLR.

[0027] In the GSM system (Global System for Mobile Communication), for example, the subscriber information of mobile stations located within the coverage area of a particular mobile services switching centre is maintained in the visitor location register VLR. The embodiment of Figure 3 assumes that the information stored in the VLR regarding the mobile stations MS3 and MS 4 includes information according to which the VLR must always inform the location of these mobile stations to the server 1 when their location changes. The location information may consist of the LAC (Location Area Code) of the area where the mobile stations are located.

[0028] In the GSM system, the base stations controlled by a particular mobile services switching centre operate in location areas. In addition to other cell information, the base stations transmit the respective location area codes LAC to the mobile stations over the radio path on a broadcast channel (BCCH). When a particular mobile station moves from one location to another and detects that it has entered the coverage area of a base station that has a different location area than the previous base station, the mobile station sends a location update message to other parts of the network through the new base station. The visitor location register thus receives information indicating that the mobile station has entered a new location area and, in accordance with the invention, the VLR can thus send the identifier of the new location area to the server 1.

[0029] What causes the monitoring means 3 to inform that a partner has been found can be determined separately in each case. According to one alternative, the information can be sent if the mobile stations of two users that according to the parameters are compatible are located within the same location area LA.

[0030] Figure 4 is a block diagram of a third preferred embodiment of the system of the invention. The embodiment of Figure 4 corresponds to a large extent to the embodiment of Figure 3, except for the transmission of the location information of the mobile stations to the server 1.

[0031] In Figure 4 the mobile communications system 4 comprises specific location centres, which maintain information about the locations of the mobile stations covered by the system. In the case illustrated in Figure 4 the system comprises a GMLC (Gateway Mobile Location Centre), which forms an interface for external applications that need locate mobile stations. In addition, each mobile services switching centre MSC1 and MSC2 is provided with a location centre SMLC1 and SMLC2 (Serving Mobile Location Centre) to take care of the positioning and the required computation regarding the mobile stations located within the coverage area of the mobile service switching centre corresponding to the serving mobile location centre in question.

[0032] There are a number of alternative ways, known per se, for locating an individual mobile station. Examples of the alternatives that can be used, either individually or in different combinations, include the following:

the mobile station informs the location indicated by the GPS receiver included in the mobile station to the location centre;

the location centre receives from other network elements the identifier of the radio cell through which the location update last sent by the mobile station was received;

5 a base station receiving signals from the mobile station measures the direction of the signals (the location of a mobile station can be defined by measurements made by two base stations); and
the distance between a base station and the mobile station is computed on the basis of a timing advance TA.

[0033] For example, the location information of mobile stations
10 located within the coverage area of the mobile services switching centre MSC1 is transmitted to the location centre SMLC1, which carries out the computations needed for determining the location. The location centre SMLC1 thus knows the locations of the mobile stations MS3 and MS4. The gateway location centre GMLC, in turn, knows the location centre where the information
15 relating to a particular mobile station can be found. Consequently, the gateway location centre GMLC may be programmed to request the locations of the mobile stations MS3 and MS4 belonging to the scope of the partner search from the location centre SMLC1 service at predetermined intervals and to forward the information to the server 1. Alternatively, the server 1 may request
20 the locations of all mobile stations covered by the service from the gateway location centre GMLC at predetermined intervals. Further, a third alternative is that the location centre SMLC1 detects on the basis of the subscriber information of the mobile stations (from the VLR, for example) that the location of the mobile stations is to be informed to the server 1 whenever these mobile
25 stations have moved a predetermined distance from the location where they were when the previous location information was sent.

[0034] In the case shown in Figure 4, the operation of the server is similar to the disclosure given in connection with Figures 2 and 3, i.e. the location of the mobile stations is transmitted to the monitoring means to
30 allow them to deduce when information about a matched partner is to be transmitted.

[0035] The block diagrams of Figures 2 to 4 assume, by way of example, that the information about the location of the mobile stations is transmitted to the server either directly from the mobile station or from the
35 mobile communications network. This is naturally only one example of how to transmit the necessary information to the server. Another alternative is that the

server operator uses the location services of a third party. In that case the location information is transmitted from the mobile communications network to the third party for use, which then forwards the information to the server. This type of solution may be useful for example when the location information
5 obtained from the mobile communications network needs to be modified/processed to bring it into a format suitable to be used at the server. The server operator thus receives processed information from the third party, which has produced the information on the basis of "raw data" obtained from the mobile communications network.

10 **[0036]** It is to be understood that the above specification and the related drawings are only meant to illustrate the present invention. A person skilled in the art will find it apparent that different variations and modifications can be made to the invention without departing from the scope and spirit of the invention disclosed in the accompanying claims.

CLAIMS

1. A method for finding a partner for persons seeking a partner,
characterized by comprising the steps of
storing in a database parameters determined by the persons
5 seeking a partner;
monitoring the locations of mobile stations used by the persons
seeking a partner; and
transmitting information indicating that a partner corresponding to
the parameters has been found, provided that the mobile stations of two
10 persons seeking a partner are located close to each other and that the
parameters stored in the database indicate that the persons in question are
compatible.
2. A method according to claim 1, **characterized** in that to
have the parameters determined by the persons stored in the database, the
15 persons send their parameters for storage in the database from their mobile
stations or through a mobile communications network.
3. A method according to claim 1, **characterized** in that to
have the parameters determined by the persons stored in the database, the
persons send their parameters for storage in the database through a WEB-
20 interface.
4. A method according to any one of claims 1 to 3,
characterized in that the location of a particular person seeking a
partner is monitored on the basis of information transmitted from the mobile
station.
- 25 5. A method according to any one of claims 1 to 3,
characterized in that the location of a particular person seeking a
partner is monitored on the basis of location information transmitted from the
mobile communications network.
- 30 6. A method according to any one of claims 1 to 5,
characterized in that information indicating that a partner
corresponding to the parameters has been found is transmitted by sending a
message to the mobile stations of both persons involved, the message
comprising at least identifier data enabling the person who receives the
message to set up a connection to the mobile station of the found partner.

7. A method according to any one of claims 1 to 5, **characterized** in that information indicating that a partner corresponding to the parameters has been found is transmitted by setting up a connection between the mobile stations of the persons that have found to be compatible.

8. A system comprising mobile stations (MS1-MS4); and means for determining the locations of the mobile stations, **characterized** in that the system further comprises:

10 a database (2) in which information is stored about parameters determined by persons seeking a partner; and

monitoring means (3) that monitor the locations of the mobile stations (MS1-MS4) used by the persons seeking a partner and transmit information indicating that a partner corresponding to the parameters has been found, provided that the mobile stations of two persons seeking a partner are located close to each other and that the parameters stored in the database (2) indicate that the persons in question are compatible.

9. A system according to claim 8, **characterized** in that the monitoring means (3) are arranged to monitor the locations of the mobile stations (MS1-MS2) on the basis of location information transmitted by said mobile stations.

10. A system according to claim 8, **characterized** in that the monitoring means (3) are arranged to monitor the locations of the mobile stations on the basis of location information originating from the mobile communications network.

11. A system according to any one of claims 8 to 10, **characterized** in that the system comprises means for storing in said database (2) parameters the users of the mobile stations (MS1-MS4) send through the mobile communications network.

12. A system according to any one of claims 8 to 10, **characterized** in that the system comprises means for storing in said database (2) parameters the users of the mobile stations (MS1-MS4) send through a WEB-interface.

13. A system according to any one of claims 8 to 12, **characterized** in that the monitoring means (3) are arranged to transmit the information indicating that a partner corresponding to the

parameters has been found by triggering a message transmission to the mobile stations (MS1-MS4) of the matched persons, said message comprising at least identifier data that the person receiving the message can use to set up a connection to the mobile station of the matched partner.

5 14. A system according to any one of claims 8 to 13, **characterized** in that the monitoring means (3) are arranged to transfer the information indicating that a partner corresponding to the parameters has been found by triggering a connection set-up process between the mobile stations (MS1-MS4) used by the matched persons.

10 15. A system according to any one of claims 8 to 14, **characterized** in that the system comprises means providing the person who has received information indicating that a suitable partner has been found with access to the database (2) to enable him to read information stored in the database about the matched partner.

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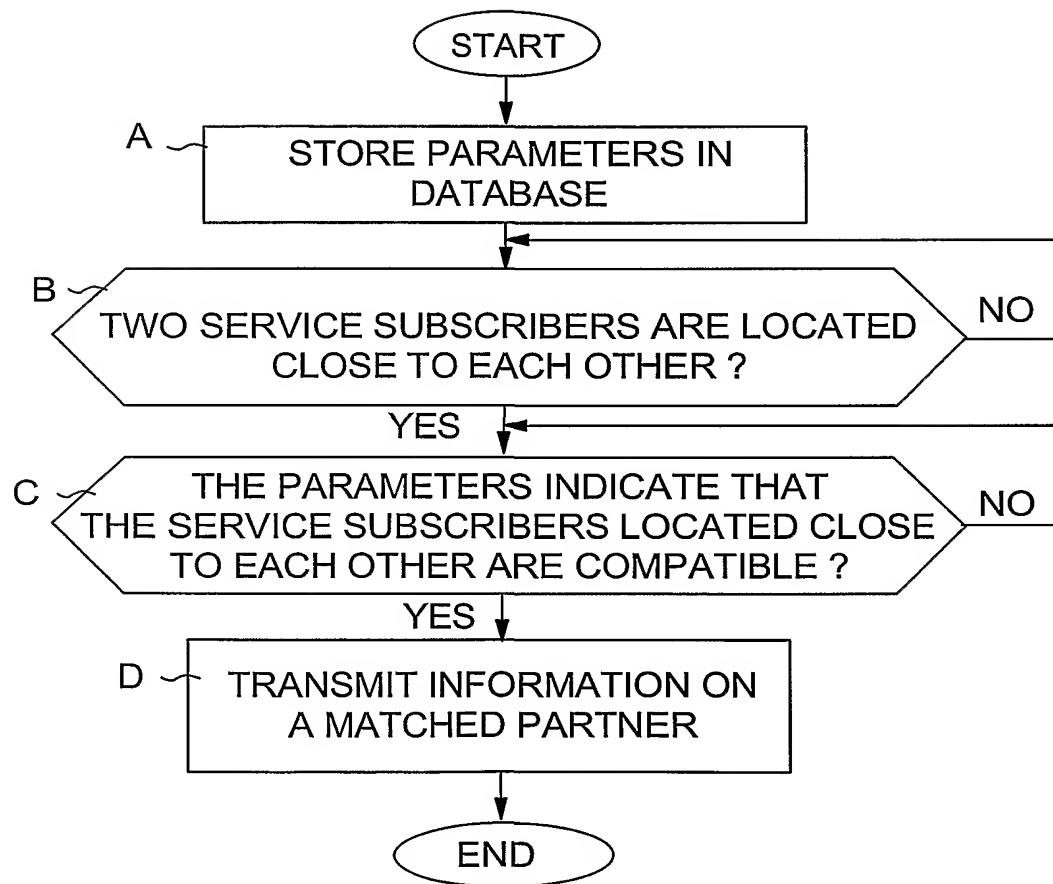


FIG. 1

2/3

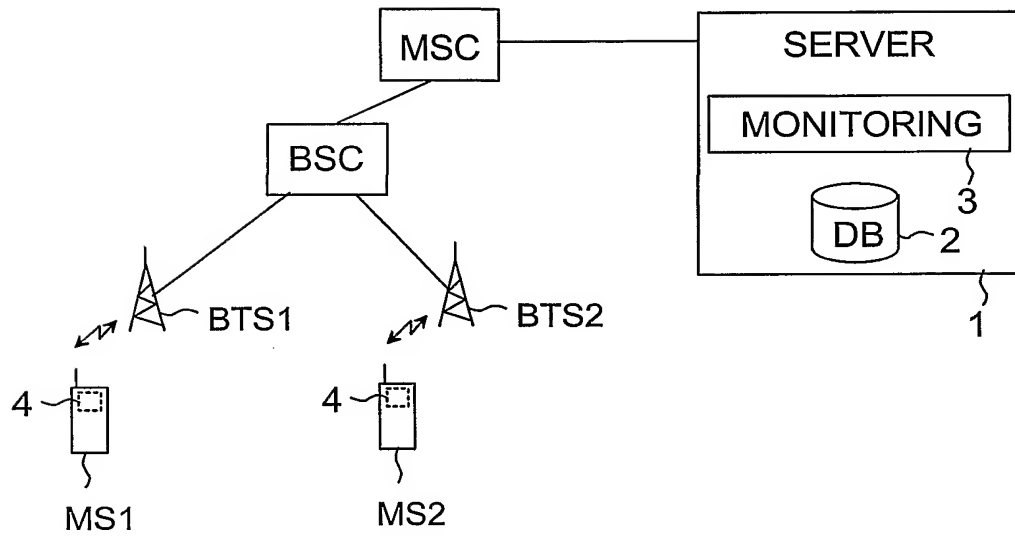


FIG. 2

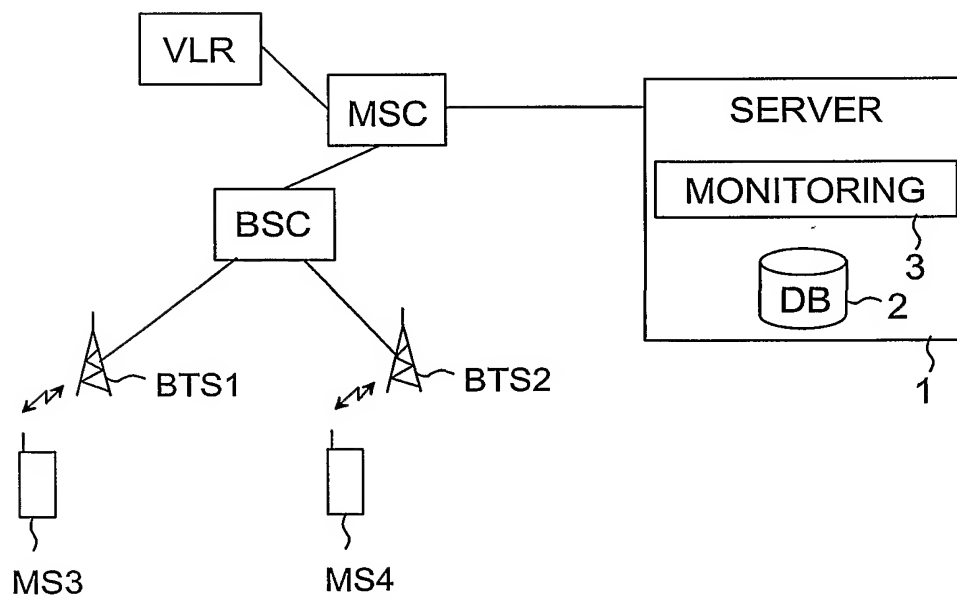


FIG. 3

3/3

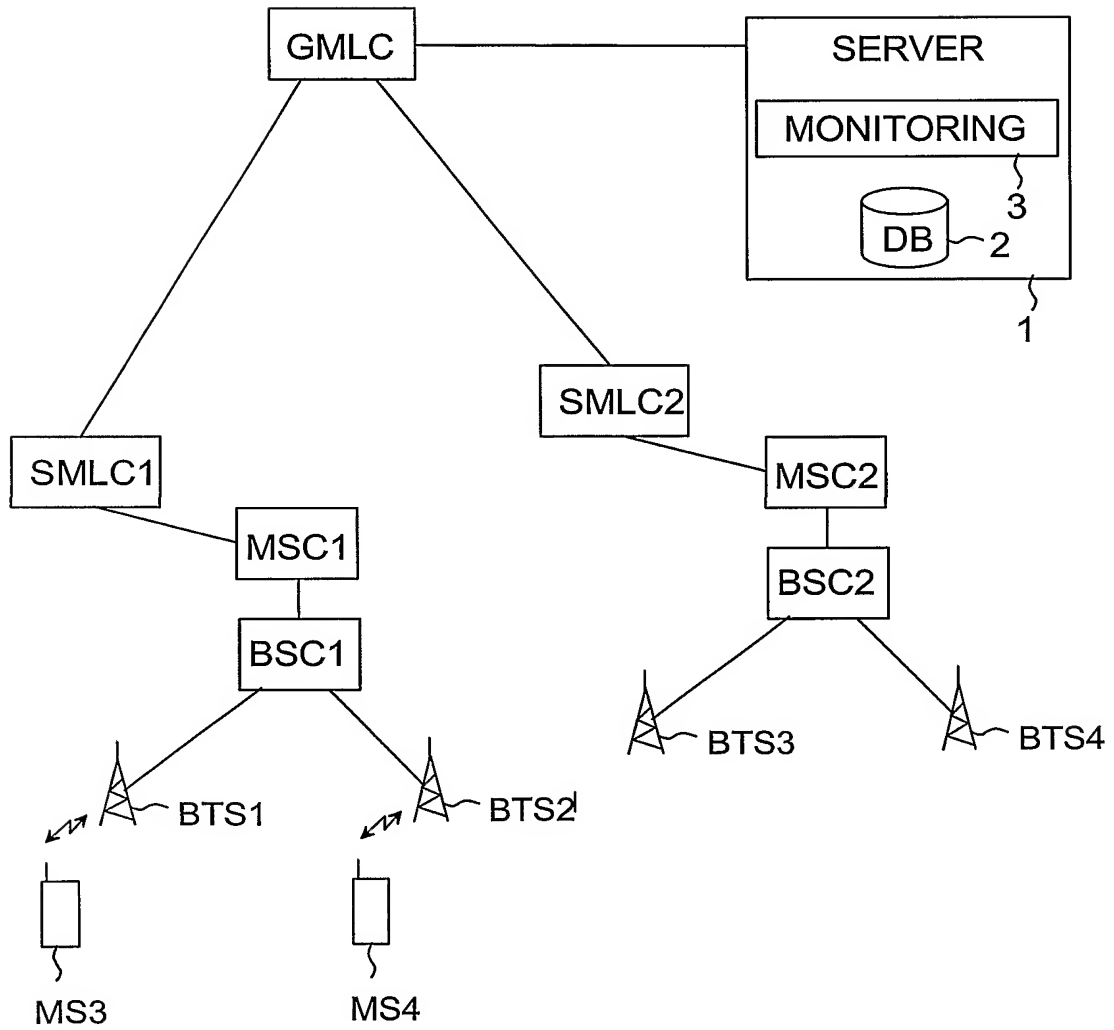


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00063

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38, G06F 17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 0019344 A2 (L.I.M.S (MANAGEMENT SYSTEMS)), 6 April 2000 (06.04.00), page 3, line 1 - page 7, line 22 --	1-15
A	EP 0853287 A2 (NOKIA MOBILE PHONES LTD), 15 July 1998 (15.07.98), column 8, line 5 - line 29; column 10, line 47 - column 11, line 25; column 18, line 45 - line 56, abstract --	1-15
P,X	WO 0115480 A1 (NOKIA CORPORATION), 1 March 2001 (01.03.01), abstract --	1-15

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

2 May 2002

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00063

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 0126408 A1 (REAL VENTURE GROUP AB), 12 April 2001 (12.04.01), page 2, line 25 - page 3, line 24, figure 2, abstract --	1-15
P,X	WO 0133429 A2 (GRAVITATE INC), 10 May 2001 (10.05.01), page 2, line 24 - page 5, line 15, abstract --	1-15
E,X	WO 0225986 A1 (MAHMOOD, VALADI), 28 March 2002 (28.03.02), page 1, line 30 - page 2, line 27, abstract -- -----	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/01/02

International application No.

PCT/FI 02/00063

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
WO	0019344	A2	06/04/00	AU	5882099	A	17/04/00
				IL	126364	D	00/00/00
EP	0853287	A2	15/07/98	CA	2225191	A	30/06/98
				FI	106990	B	00/00/00
				FI	965278	A	01/07/98
				JP	10257100	A	25/09/98
				US	6154745	A	28/11/00
WO	0115480	A1	01/03/01	AU	6779100	A	19/03/01
WO	0126408	A1	12/04/01	AU	7977200	A	10/05/01
				SE	9903571	A	06/04/01
WO	0133429	A2	10/05/01	AU	1345801	A	14/05/01
WO	0225986	A1	28/03/02	NONE			